HUMAN FACTORS ASSESSMENT OF THE TELIDON AVIATION BRIEFING SYSTEM: TABS USER SURVEY

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HUMAN FACTORS ASSESSMENT OF THE TELIDON AVIATION BRIEFING SYSTEM: TABS USER SURVEY

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Successful completion of this study would not have been possible without the cooperation of management, staff and pilots at airports in the following locations:

Maple, Buttonville, Brampton, Guelph, and Waterloo-Wellington.

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1.0 Executive Summary

This report is based on a survey of pilots which is part of an evaluation of the Telidon Aviation Briefing System (TABS). TABS was introduced at 14 Southern Ontario airports in August 1984 for a two-year trial period. The survey was conducted in the summer of 1985 and does not reflect changes to the system that have been made since then. In particular, the speed of TABS was relatively slow when the survey was conducted. Since that time efforts have been made to improve the speed, accuracy, and timeliness of the system.

The survey was designed to obtain feedback from TABS users and from non-users regarding their use of, and attitudes toward TABS and other aviation weather briefing services. Other components of the overall evaluation include a description of TABS and the other weather services, (the background report), and a final report which includes a summary of findings and an evaluation of pilots' performance after using TABS.

The sample included 164 pilots of which 46 were non-users. Most users had obtained a TABS briefing within one month of being surveyed. Approximately one-half of TABS users had used the system more than 15 times. Users varied considerably in age, license type, flying frequency and type of aircraft. Because overall ratings and usage of TABS were not significantly related to pilot characteristics, survey results are reported for pilots as a group. Non-users knew very little about TABS. This result suggests that people not currently using TABS are unaware of it rather than avoiding it.

The surveyed pilots indicated that the introduction of TABS had reduced their frequency of using the other weather information services and had reduced the percentage of times they received no weather briefing before flying.

Pilots indicated that TABS is used most frequently by itself, although some pilots reported that they sometimes used it in combination with the other weather information services, particularly the phone services. Results also indicate that pilots prefer to use TABS compared to other briefing services in general when preparing to take a local flight, for flight training, or to obtain some information about weather conditions, (e.g., curiosity about the weather, or to expand or update a prior briefing), but there is no clear preference when planning an itinerant flight or when making a go/no go decision.

The overall reaction to TABS is favorable, with 69% of users rating it good or excellent. There are also positive ratings of the type of information available, the format of the pages, the features that affect interactions with the system and the electronic and printed support materials. Concerns were expressed, however, about the timeliness of the information, the speed of the system, the lack of personal contact, the hours of operation, and the need to wait in line.

In comparison to the telephone briefing services, TABS receives similar ratings in terms of usefulness, amount and type of information, ease of use and time to begin a briefing session.

Phone services are rated higher in the accuracy and timeliness of information, time to learn the system, briefing time and reliability.

In terms of their overall reactions to the current version of TABS, pilots were most strongly influenced by their judgments of the accuracy and timeliness of the information, the speed of the system and how well the information in the system serves their needs.

Pilots were given a list of 19 potential enhancements and asked to indicate the extent to which each enhancement would encourage or discourage their use of TABS. The five possibilities rated most encouraging were: 1) the ability to file a flight plan using TABS; 2) a printed copy of relevant weather information that pilots can take with them; 3) a system that provides an automatic warning if the filed flight plan may involve risk; 4) the ability to use TABS from home; and 5) displays that show the movement of weather systems.

Significantly positive ratings were also received by the following: briefings tailored to specified routes, wider availability of TABS, information for Canada and North America, additional radar sites, the ability to use TABS from business locations, computer-based refresher courses, and the ability to select three upper-level winds. Other possibilities not given significantly positive ratings were: audio information to supplement the visual information, simpler keyboards, global weather information, weather information for North and South America and information about weather above 18,000 feet.

2.0 Introduction

The Telidon Aviation Briefing System (TABS) allows pilots to prepare for a flight by interacting with a computerized weather and airport information data base. Information is presented in a variety of formats including weather maps, numerical tables and text. TABS is intended to supplement existing briefing services, especially telephone briefings provided by the Atmospheric Environment Service (AES) and Flight Service Stations (FSS). A two year trial of TABS began in August, 1984 in 14 Southern Ontario airports. The survey was conducted in the summer of 1985 and does not reflect changes to the system that have been made since then. In particular, the speed of TABS was relatively slow when the survey was conducted. Since that time efforts have been made to improve the speed, accuracy, and timeliness of the system.

The survey was designed to obtain feedback from TABS users and from non-users regarding their use of and attitudes toward TABS and other aviation weather briefing services. Other components of the overall evaluation include a description of TABS and the other weather services (Human Factors Assessment of the Telidon Aviation Briefing System: Background Report), and an evaluation of pilot performance after using TABS, which will be included in the final report.

The present survey included questions about the following issues:

- who uses TABS (expertise as pilots, background, how often they have used TABS etc.);
- why pilots use TABS (curiosity, flight training, route briefing, preliminary briefing, etc.);
- how pilots use TABS (do they use it alone or in conjunction with other services);

- attitudes towards TABS and the phone-in services;
- what weather information service pilots used before TABS;
- whether TABS has changed the types of weather services pilots use or the likelihood they use a weather information service;
- how pilots rate features of TABS (e.g., reliability, time to get a briefing, use of graphics, time to sign on, etc.); and
- which enhancements pilots say would encourage greater use of TABS.

3.0 Method

3.1 Materials. Two questionnaires, consisting primarily of multiple-choice questions were developed. The "user" questionnaire was developed for pilots and student pilots who had used TABS one or more times. The "non-user" questionnaire was given to pilots who indicated that they had never used TABS.

The user questionnaire consists of four major sections. The first section asks questions such as how frequently the pilot had used TABS since its introduction and why he uses weather information services generally, and TABS in particular. The second section asked pilots to consider a number of features of the TABS system and to indicate using a five-point scale whether that feature encouraged or discouraged use of TABS. Pilots were asked to evaluate features of TABS such as the time it takes for TABS pages to get displayed, the adequacy and timeliness of the information displayed, and aspects of the interaction between the pilot and the computer system. The third section listed a number of changes that could be made to TABS and asked pilots to indicate on a five-point scale whether that change would increase or decrease their use of the system. The fourth section asked for background information about the respondent--his age, sex, licence type, meteorological training, and so on.

The non-user questionnaire is an abbreviated version of the user questionnaire. Copies of both questionnaires are contained in Appendix 4.

3.2 Design and procedure. Drafts of the questionnaires, developed with the help of knowledgeable people from the Atmospheric Environmental Service, Transport Canada, and the Ministry of Transportation and Communications, were pretested by giving them to about 10 pilots.

Following completion of the questionnaire, each pilot was interviewed and his answer to each question was discussed to determine if any questions were ambiguous or confusing. Based on the pretest results, the questionnaires were revised.

The revised questionnaires were then given to pilots from May to August 1985 at some of the airports in Southern Ontario where TABS had been installed. These airports were Maple, Buttonville, Brampton, Guelph, and Waterloo-Wellington.

The following procedure was used to administer the questionnaires. An administrator of the questionnaires, situated in an airport, would approach a potential respondent, and after introducing herself or himself and briefly describing the purpose of the study, would first ask if the respondent was a pilot or student pilot, and then would ask whether he "had ever used TABS". If the respondent was interested in participating in the study, he or she would be given a user questionnaire if the respondent answered yes to both questions and the non-user questionnaire if the respondent answered "yes" to the first and "no" to the second question. If the potential respondent was not a pilot or student pilot neither questionnaire was given.

After ensuring that the format of filling out the questionnaire was understood, each respondent was given the appropriate questionnaire which took about 20 minutes to complete. Respondents completed the questionnaire on their own but were encouraged to talk to the questionnaire administrator if they had any questions.

4.0 Results and Discussion

4.1 Sample. About 90% of those approached who were eligible to be in the study agreed to fill out a questionnaire. The user questionnaire was completed by 118 pilots and the non-user questionnaire was filled out by 46 pilots. However, 10 of those filling out the non-user questionnaire were eliminated from the sample because they indicated in filling out the questionnaire that they had used TABS.

Tables 1 and 2 describe the demographic characteristics of the people who completed the user and the non-user questionnaires and compares the demographic characteristics of the survey sample to statistics from Transport Canada which describe the pilots and aircraft found in Canada in 1983.

In comparing the characteristics of the survey sample to the Transport Canada statistics, it should be remembered that the people in the survey sample were recruited at airports. Therefore, the sample will tend to include frequent fliers and exclude infrequent fliers, whereas the Transport Canada data are as likely to include a frequent flier as an infrequent one. In addition, the survey did not seek out professional pilots by going to a large commercial airport like Pearson International Airport, because the TABS service was not designed for these users, many of whom already have corporate weather information services and need information about weather conditions at high altitudes, which is currently unavailable on TABS.

The results from Table 1 indicate that the proportion of men and women in the survey sample is similar to the Transport Canada statistics although there is a slightly higher percentage of women in the survey sample (12%) than in the Transport Canada data (6%), ($X^2(1) = 10.97$).

The ages of the pilots in the sample varied widely with 54% of the people 35 years of age or younger. The age distribution in the sample is not statistically different from the Transport Canada data, ($X^2(3) = .2$, n.s.).

In terms of licence type the survey sample differs significantly from the Transport Canada data by having a higher percentage of pilots with a commercial pilot's licence or higher (43%) compared with Transport Canada (22%) and a lower percentage of people with a private pilot licence or student licence (57%) than Transport Canada data (78%), ($X^2(4) = 38.96$, $p < .001$). This result is probably attributable to the tendency of more highly qualified pilots to fly more frequently, a result found in this study.

Table 2 compares the aircraft used in our sample with the Transport Canada data. Results indicate that our sample tends to use lighter aircraft (74% weighing less than 2000 kilograms) than the Transport Canada sample, in which 48% weighed less than 2000 kilograms, ($X^2(7) = 63$, $p < .001$.), and are more likely to use pistons (91%) as a source of propulsion than in the Transport Canada sample (54%), ($X^2(3) = 159$, $p < .001$). These results are probably the result of the decision not to survey professional pilots who fly larger turboprops and jets out of large commercial airports like Pearson International Airport.

Because pilot characteristics are not related to overall ratings or usage of TABS, results of this survey are presented for pilots in general. This analysis of pilot characteristics is summarized in section 4.6 and discussed in detail in Appendix 2.

4.2 Current use of TABS. About one quarter of those surveyed by Norpark indicated that they had never used TABS and for this reason they completed

the non-user questionnaire. An analysis of the non-user questionnaire indicated that most non users know very little about the TABS system, even though they were contacted at airports where the system had been available for some time. Only about 1% of the non-users felt that they knew enough about TABS to evaluate different aspects of the system. This result is important because it suggests that people not currently using TABS are unaware of it, rather than avoiding it because it has a bad reputation. Because of this low awareness, responses of the non-user group are not further analyzed in this report.

There was considerable variation in the number of times TABS users had interacted with the system. The median number of times TABS had been used per user was 15; 40% of the respondents indicated that they had used TABS 10 times or fewer, and 16% were heavy users of the system, having used TABS more than 80 times.

Analyses of the user questionnaires indicated that most respondents had used TABS recently; 61% indicated that they had used TABS within a month of filling out the questionnaire and all but 6% had used TABS within 3 months of completing it.

Table 3 shows the effect of TABS on the stated use of other various weather information services. The left-most column names the type of briefing, the next 2 columns contain the average stated use of the service before and after the introduction of TABS; the next column contains the difference in stated use before and after the introduction of TABS and the right-most column indicates whether that difference is statistically significant at the .05 level or better, as calculated by a t-test for related samples.

Table 3 shows that for every type of weather service the effect of

introducing TABS has been to reduce the stated frequency of using that service. In each case the reduction is statistically significant. Of particular importance, from the standpoint of aviation safety is the finding that respondents indicated they were also less likely to receive no briefing after the introduction of TABS compared with before its introduction.

Table 4 shows the use of TABS alone and in combination with the other weather services. Results from this table indicate that pilots tend to use TABS alone. About 80% of those surveyed indicated that they sometimes, usually, almost always, or always used TABS alone. Only 20% indicated that they never or rarely used TABS alone. This difference is statistically significant as determined by a chi-square test, $p < .001$. Table 4 also suggests that when TABS is used in combination with the other weather information services it is likely to be with the telephone briefing services, although the majority of respondents indicated that they use this combination never or rarely.

The general impression from all of these findings is that the introduction of the TABS system has had a real impact on the use of other weather information services by many of the pilots; pilots state that they are using the other weather information services less frequently and are less likely to fly without a briefing of any kind.

4.3 Reasons for using weather information services. Table 5 shows the percentage of time pilots use any weather information service as a function of the reason for being briefed. The results indicate first, that pilots use weather information services for a variety of different reasons, and second that some reasons for getting briefed are more likely to result in the pilot using a weather service than others. Pilots are

likely to use a weather information service, as confirmed by the results of chi-square tests, when they are planning an itinerant flight (taking off from one airport and landing in a different one), making a go/no go decision, or wanting to obtain a general idea about weather conditions.

Table 6 shows the preference for TABS versus the other weather information services as a function of the reason for being briefed. A chi-square test was used to determine whether there was a statistically significant difference between those preferring TABS versus those preferring non-TABS services. Pilots report that they prefer to use TABS for most purposes, but when planning an itinerant flight or making a go/no go decision, there is no clear preference between TABS and other weather information services.

4.4 Pilots' ratings of weather service features. The overall rating of TABS was favorable, with 69% of those surveyed rating it as good or excellent and only 10% rating TABS as very poor or inadequate. These results should be interpreted in the context of responses to specific features of TABS discussed below.

Table 7 shows the average rating of various service characteristics for phone and TABS weather services. Higher ratings indicate that the characteristic is more likely to encourage use. Statistical significance for each type of service was evaluated using a chi-square test which compared the frequency of pilots indicating that the feature discouraged use (rating 1 or 2) to the frequency of pilots rating the feature positively (rating 4 or 5).

This analysis showed that the following four features of TABS are reported to encourage use: 1) its usefulness; 2) the effort it takes to use it; 3) the information it contains; and 4) the accuracy of the

information. However, pilots indicated that three features discourage use: 1) the reliability of TABS; 2) the time it takes to get into TABS; and 3) the timeliness of the information in TABS. Pilots indicated that all features of the phone services encourage its use except for the time it takes to reach a briefer. That feature is reported to discourage use of the service.

All of these results are consistent with previous findings which have found that there are problems establishing a reliable phone connection with the computer and that there have been other equipment problems. In addition, pilots have indicated that signing on to the system is time consuming and preliminary findings from a quality assurance study indicated that information on the TABS system is not always up to date. The finding that difficulties getting through to a briefer discourages use of the phone service is consistent with results from "busy" studies which found that pilots frequently get a busy signal when they try to get information by telephone from either of the weather information services.

The differences between average ratings given to the different service characteristics for phone and TABS services were tested by t-tests for related measures. Results, shown on the right-most column of Table 5, indicate that ratings for reliability, time to get a briefing, timeliness, accuracy of information, and time to learn how to use the system were significantly lower for TABS than for the phone service. In contrast, TABS was not rated significantly higher than the phone service on any service characteristic.

Table 8 shows the effect of various features of TABS on reported use of the system. Column 1 names the feature, columns 2, 3, and 4 give the percentages of pilots indicating that the feature discouraged use, had no

effect, or encouraged use. Column 5 gives the difference between the discourage and encourage use percentages and the right-most column indicates whether this difference is statistically significant by a chi-square test.

Results indicate that some features of TABS encourage while other features discourage use of the system. Positively rated aspects of TABS are the use of graphics (maps and symbols, colour contrast, colour coded maps), the information content (geographical coverage and different altitude winds), the patterns of interaction with TABS (self paced, use of menus, selected briefings) and other features (HELP pages and printed instructions manual).

The negatively rated features of TABS in this table are consistent with the results shown in Table 7 but indicate in more detail aspects of TABS that discourage use of the system. These features include the speed of TABS (the time for maps and other pages to display, the time to sign on to the system, total briefing time), the accuracy and timeliness of the information, the lack of personal contact with a briefer, and other properties of TABS (the hours of operation of TABS and waiting in line). When interpreting these results it should be recalled that the survey was conducted at a time when TABS response time was relatively long. Since then, efforts have been made to improve the speed, accuracy, and timeliness of the system.

4.5 Effects of possible changes on the use of TABS. Table 9 summarizes results from a question that gives users a list of possible changes to TABS and asks how much each change would encourage or discourage their use of the system. Pilots were not asked about their willingness to pay for any of these changes. These data should be interpreted with caution

because users are being asked to evaluate changes that they have never seen. It should also be noted that this survey was not designed to assess the technical feasibility or cost-benefit of these changes or their likely impact on the effectiveness of TABS.

The results are useful, however, because they provide at least a preliminary indication about what features are likely to encourage more frequent use of TABS. The system enhancements listed in Table 7 are ordered from those judged to encourage use of TABS most to those judged to have the least encouraging effect on TABS usage. To provide the reader with a means of judging the results obtained, two chi-square statistics were calculated. The results of the more stringent one, shown in column 5, tested whether the percentage of people indicating that the introduction of TABS would very much encourage its use (column 4) was significantly higher than all other responses.

Using this stringent criterion the following changes were statistically significant. 1) Most pilots indicated that they wanted to be able to file a flight plan. The desire to have this capability can be readily understood because pilots who currently get briefed by TABS then must go through an extra step and submit a flight plan to Transport Canada. This may involve several phone calls because the lines to briefers are frequently busy. 2) Pilots want to be able to obtain print outs of relevant weather information. This seems like a desirable feature from a human factors perspective, because it reduces the need for pilot to rely on their memories or possibly some notes they took, when trying to remember details of a weather briefing they may have had hours ago. 3) Pilots indicated that they wanted to have a system that would warn them if the filed flight plan may involve some risk. 4) Pilots want to be able to

use TABS from home. 5) Pilots indicated that they would like TABS to be able to display the movement of weather in an almost animated way so that they could obtain a better idea of weather movements and the effect these would have on their flights.

The less stringent test of statistical significance, tests whether the total percentages in columns 3 and 4 (would somewhat or very much encourage use) is significantly higher than the percentage in column 2 (all other responses) by a chi-square test. Results from these tests indicate that the following additional changes would also encourage use of TABS: 1) Corridor briefings; 2) TABS available across Canada; 3) information from additional radar sites; 4) weather information about the rest of Canada and for all of North America; 5) access to TABS from businesses; 6) refresher courses in aviation meteorology; 7) and information about the 3 upper winds. Other possibilities not given significantly positive ratings were: audio information to supplement the visual information, simpler keyboard, global weather information, weather information for North and South America and information about weather above 18,000 feet.

Taken together with the pilots evaluation of the current TABS system, it appears that pilots would like to see a weather system that is reliable, contains up-to-date and comprehensive information, which can be used easily and quickly. Beyond that they indicated that some changes to the system would encourage more frequent use of it. The most important of these changes are the ability to file a flight plan, get printouts of weather information, get warnings if a potentially unsafe flight plan is filed, the capability of using TABS from home, and be able to see weather movements depicted on the screen. Additional desirable changes would

include more information available in more locations.

4.6 Results from multiple regression analyses. In order to better understand the results obtained and to identify those factors that predict pilots rating and use of TABS, a series of multiple regression analyses were performed. A detailed description of these analyses, while of some interest, is involved and may be somewhat difficult for a reader unfamiliar with statistics to follow. For this reason, the report includes only a brief summary; the detailed description can be found in Appendix 1.

A series of regression analyses were conducted to better understand the primary factors that influenced pilots' global reactions to TABS i.e. reported use, rating of usefulness and overall rating. Two types of factors were examined, pilot characteristics and pilots ratings of general features of TABS (e.g. speed, adequacy of information, reliability, etc.). In some cases, for example, speed, pilots' ratings were based on responses to more than one question. The analysis of pilot characteristics indicated that, with one exception, global reactions to TABS were not significantly different for different types of pilots. The one exception was that more frequent flyers tend to use TABS more often, not a surprising result. This analysis justifies treatment of survey results in terms of pilots responses in general.

The analysis of pilot reactions to general features of TABS indicates that global reactions to TABS are significantly related to their ratings of the following general features: accuracy of information, timeliness of information, the speed of the system and how well the information serves the needs of the pilot. Identification of the first three features reinforces the importance of the negative reaction of pilots to these

particular features. When interpreting these results it should be recalled that the survey was conducted at a time when TABS responded relatively slowly. Since then efforts have been made to improve the speed, accuracy and timeliness of the system. Although the adequacy of information in TABS is rated positively, the results of this regression analysis suggest that the information needs of the pilots using TABS need to be better understood.

5.0 General Discussion

The sample included 164 pilots of which 46 were non-users. Most users had obtained a TABS briefing within one month of being surveyed. Approximately one-half of TABS users had used the system more than 15 times. Non-users were generally unaware of TABS, which would seem to account for their not using it. Because of this low awareness, non-users responses to features of TABS were not included in this report. Users' overall reactions to TABS and their frequency of TABS use were not strongly affected by their personal characteristics. For this reason, results of the survey are presented for pilots in general.

The surveyed pilots indicated that the introduction of TABS had reduced their frequency of using the other weather information services and had reduced the percentage of time they received no weather briefing before flying.

Pilots indicated that TABS is used most frequently by itself, although some pilots reported that they sometimes used it in combination with the other weather information services, particularly the phone services. Results also indicate that pilots prefer to use TABS compared to other briefing services when preparing to take a local flight, for flight training, or to obtain some information about weather conditions, (e.g. curiosity about the weather, or to expand or update a prior briefing), but there is no clear preference when planning an itinerant flight or making a go/no go decision.

Compared with the general population of pilots in Canada, TABS users in the survey sample tended to have higher rated licences and fly lighter, piston propelled aircraft. These differences probably reflect the more frequent flying habits of pilots with higher rated licenses and the choice

of smaller airports for the survey, where these aircraft are more common.

The overall rating of TABS is positive, with 69% of users rating it good or excellent. There are also positive ratings of the type of information available (geographical coverage, winds), the format of the pages (maps and symbols, colour contrast, colour coding of some maps), the features that affect interaction with the system (self pacing, the use of menus, selected briefings) and the electronic and printed support material, (Help pages, printed instruction manual).

Pilots expressed concerns about the timeliness of information, the speed of the system (briefing time, time to sign on, time for maps and other pages to display), the lack of personal contact, the hours of operation, and the need to wait in line. As previously mentioned efforts have been made to improve the speed, accuracy, and timeliness of the information on TABS since the survey was conducted.

When contrasted with the telephone briefing services, users do not rate TABS differently in terms of usefulness, amount and type of information, ease of use or time to begin a briefing session. Telephone briefing services are rated higher in the accuracy and timeliness of information, time to learn the system, briefing time and reliability.

In terms of their overall reactions to the current version of TABS, pilots were most strongly influenced by their judgments of the accuracy and timeliness of the information, the speed of the system and how well the information in the system serves their needs.

Pilots were given a list of 19 potential enhancements and asked to indicate the extent to which each enhancement would encourage or discourage their use of TABS. The five possibilities rated most encouraging were: 1) The ability to file a flight plan using TABS; 2) a

printed copy of relevant weather information that pilots can take with them; 3) a system that provides an automatic warning if the filed flight plan may involve risk; 4) the ability to use TABS from home; and 5) displays that show the movement of weather systems. Significantly positive ratings were also received by the following: briefings tailored to specified routes, wider availability of TABS, information for Canada and North America, additional radar sites, the ability to use TABS from business locations, computer based refresher courses, the ability to select three upper-level winds. Other possibilities not given significantly positive ratings were: audio information to supplement the visual information, simpler keyboard, global weather information, weather information for North and South America and information about weather above 18,000 feet.

In summary, this study was designed to assess TABS from a user's perspective. Responses from a wide variety of pilots who have used TABS provide valuable insights into how effectively the system functions and how it could be improved from the pilots' perspective.

It should be noted that this survey was not designed to assess the technical feasibility or cost-effectiveness of system modifications. In addition, users' judgements may not accurately predict the actual impact of these changes on their actual use of TABS. The survey also did not ask how effectively pilots can use TABS to obtain the aviation weather information needed to plan a safe flight. This question will be addressed in the next phase of the project.

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Table 1

Comparison of Users and Non-users of TABS
in Survey Sample with 1983 Transport Canada Statistics

Pilot characteristic	Percentage of pilots			
	Users (N=118)	Non-users (N=36)	Users and non-users (N=154)	Transport Canada
A. Sex				
Female	15	3	12	6
Male	85	97	88	94
Total	100	100	100	100

$X^2(1) = 10.97, p < .01$

	Users (N=117)	Non-users (N=36)	Users and non-users (N=153)	Transport Canada
B. Age				
under 25	22	9	18	18
25-35	38	25	36	37
36-45	24	30	25	25
over 45	16	36	21	20
Total	100	100	100	100

$X^2(3) = .2$, n.s.

	Users (N=117)	Non-users (N=35)	Total (N=152)	Transport Canada
C. Licence type				
Student permit	13	14	13	22
Private pilot	39	63	44	56
Commercial pilot	27	11	24	11
Senior commercial	03	6	4	2
ATR	18	6	15	9
Total	100	100	100	100

$X^2(4) = 38.96, p < .001.$

Table 2

Comparison of Aircraft Used by Users and Non-users in Survey Sample with 1983 Transport Canada Data

Aircraft characteristic	Percentages			
	Users (N=115)	Non-users (N=34)	Users and non-users (N=149)	Transport Canada
A. Takeoff Weight (kg.)				
2,000 and under	73	80	74	48
2,001-4,000	17	11	16	11
4,001-5,670	3	3	3	8
5,671-18,000	4	0	3	5
18,001-35,000	0	3	1	5
35,001-70,000	0	0	0	14
70,001-136,000	2	0	1	6
over 136,000	1	3	2	3
Total	100	100	100	100

$X^2(7) = 63, p < .001$

	Users (N=117)	Non-users (N=35)	Users and non-users	Transport Canada
B. Source of propulsion				
Piston	90	94	91	54
Turboprop	5	3	4	12
Jet	5	3	5	27
Other	0	0	0	7
Total	100	100	100	100

$X^2(3) = 159, p < .001$

Table 3

Effect of TABS Introduction on Use of Briefing Services

Type of briefing	Average rating[1] before TABS	Average rating after TABS	Difference, before & after	Statistical significance
Phone	4.18 (.14)[2]	3.30 (.14)	.88	$p < .001$
Face-to-face	2.83 (.14)	2.39 (.13)	.44	$p < .001$
TWB	2.70 (.16)	2.42 (.15)	.28	$p < .01$
No briefing	1.94 (.12)	1.59 (.08)	.35	$p < .01$
Other	2.70 (.27)	2.05 (.26)	.65	$p < .05$

[1]Ratings: 1 = never; 2 = rarely; 3 = sometimes; 4 = usually; 5 = almost always; 6 = always.

[2]Numbers in brackets denote the standard error of the mean.

Table 4

Use of TABS Alone and with Other Weather Services

Type of briefing	Percentage of responses			
	Never or rarely	Sometimes, usually, almost always, or always	Difference	Significance
TABS alone	20	80	-60	.001
TABS then phone	60	40	20	.05
Phone then TABS	70	30	40	.001
TWB then TABS	78	22	56	.001
Personal then TABS	83	17	63	.001
TABS then personal	86	14	72	.001
TWB then TABS	88	12	76	.001

Table 5

Frequency of Using any Weather Service as a Function of Pilots' Reasons for Being Briefed

Reasons for being briefed	Percentage of responses		
	Never, rarely, or sometimes	Usually, almost always, or always	Statistical significance
Itinerant	23	77	.001
Local	64	36	.01
Go/No go	35	65	.01
Flight training	51	49	n.s.
General idea about weather	36	64	.01
Update/Expand prior briefing	59	41	n.s.
Curiosity	63	37	.01

Table 6

Preference for TABS vs. Other Services as a Function of User's Reasons for Being Briefed

Reasons for being briefed	Percentage of responses			
	Prefer TABS	No preference	Prefer non-TABS	Significance
Itinerant	42	30	28	n.s.
Local	50	40	10	.001
Go/No go	34	32	34	n.s.
Flight training	46	41	13	.001
General idea about weather	54	28	18	.001
Update/expand prior briefing	44	37	19	.001
Preliminary briefing to prepare for later briefing	50	29	21	.001
Curiosity	66	29	05	.001

Table 7

Effect of Various Service Characteristics on Use of TABS and on Use of Phone Briefings

Service characteristic	Average[1] rating		Difference	Statistical
	TABS	Phone	TABS vs. Phone	significance
Useful	4.00 (+)[2]	3.60 (+)	.40	n.s.
Reliable	2.71 (-)	3.82 (+)	-1.11	.001
"Getting in"	2.53 (-)	2.35 (-)	.18	n.s.
Effort	3.28 (+)	3.28 (+)	.00	n.s.
Briefing time	2.90 (n.s.)	3.38 (+)	-.48	.01
Information	3.90 (+)	3.64 (+)	.26	n.s.
Timeliness	2.62 (-)	3.38 (+)	-.76	.001
Accuracy	3.36 (+)	3.96 (+)	-.60	.001
Time to learn	3.04 (n.s.)	3.50 (+)	-.46	.01

[1]Ratings: 1 = very much discourages use; 2 = somewhat discourages use; 3 = no effect; 4 = somewhat encourages use; 5 = very much encourages use

[2]Symbols: + indicates that the feature encouraged use;
- indicates that the feature discouraged use;
n.s. indicates that there was no statistically significant effect.

Table 8

Effect of Various Features of TABS on Use of the System

System feature	Percentage of responses				
	Discourages use (1)	No effect (2)	Encourages use (3)	Difference 1 - 3	Statistical significance
Speed					
Time to sign on	59	28	13	46	.001
Time for maps	59	32	09	50	.001
Other pages	48	39	13	35	.001
Briefing time	52	26	18	34	.001
Info available					
Out of date	60	32	08	52	.001
Maps and symbols	04	37	59	- 55	.001
Colour contrast	06	26	68	- 62	.001
Abbreviations	16	54	30	- 14	.05
Geographical cov.	13	34	53	- 40	.001
Diff. alt. winds	06	40	54	- 48	.001
Maps too cluttered	20	69	11	09	n.s.
Use of red/green/ yellow	04	37	59	- 55	.001
Not enough detail	19	74	07	12	.05
Interaction					
Self paced	08	20	72	- 64	.001
Use of menus	17	29	54	- 37	.001
Structured briefing	28	36	36	- 08	n.s.
Selected briefing	11	27	62	- 51	.001
Lack of personal contact	36	55	09	27	.001
Other					
Time to learn	30	50	20	10	n.s.
Help pages	08	40	52	- 44	.001
Printed instruction manual	15	46	39	- 14	.001
Reliability of equipment	45	30	25	20	.05
Waiting in line	47	43	10	37	.001
Hours of operation	30	60	10	20	.01

Table 9

Anticipated Effects of Possible Changes on Use of TABS

System improvement	Percentage of responses			Stat. sig.[1]	Stat. sig.[2]
	very much dis. use, somewhat dis. use, or no effect	somewhat encourages use	very much encourages use		
Flight plan	13	24	63	.01	.001
Print out	10	29	61	.05	.001
Auto warning	17	23	60	.05	.001
Home use	14	27	59	.05	.001
Weather movement	09	32	59	.05	.001
Corridor briefing	17	30	53	n.s.	.001
TABS available across Canada	17	30	53	n.s.	.001
Radar sites	17	34	49	n.s.	.001
Weather info for N.A.	31	26	43	n.s.	.001
Weather info for Canada	30	28	42	n.s.	.001
Business use	34	29	37	n.s.	.001
Refresher courses	33	33	34	n.s.	.001
3 upper winds	31	39	30	n.s.	.001
Clearer pictures	45	29	26	n.s.	n.s.
Audio	51	28	21	n.s.	n.s.
Keyboard	61	24	15	n.s.	n.s.
Global weather info	71	14	15	n.s.	n.s.
Weather info for N.A. and S.A.	72	14	14	n.s.	n.s.
High altitude	68	19	13	n.s.	n.s.

[1]Tests whether percentage in column 4 is significantly higher than the total of columns 2 and 3.

[2]Tests whether total percentage in columns 3 and 4 is significantly higher than the percentage in column 2.

Table 10

Correlation Matrix of Variables Used in Multiple Linear Regression Analyses

	Use	Freq.	Rating	Speed	Info	Graph	Interaction	Reliability	Learn	Expert	Sex	Age	Hours
Usefulness of TABS	1.00												
Frequency of use	.29	1.00											
Overall Rating	.43	.26	1.00										
Speed	.58	.08	.48	1.00									
Adequacy of info	.46	.27	.41	.37	1.00								
Graphics	.42	.06	.44	.40	.48	1.00							
Interaction	.53	.12	.44	.57	.50	.45	1.00						
Reliability	.29	-.10	.26	.44	.19	.17	.20	1.00					
Learn	.52	.27	.40	.60	.40	.40	.49	.17	1.00				
Expert	-.17	.30	-.18	-.29	-.12	-.10	-.17	-.07	-.08	1.00			
Sex of pilot	.09	-.02	.14	.03	-.03	-.01	.12	.01	.09	-.12	1.00		
Age of pilot	-.10	-.14	-.12	-.01	-.09	-.10	-.08	.06	-.24	-.05	-.19	1.00	
Hours flown	-.21	.42	-.12	-.36	.05	-.07	-.24	-.34	-.09	.65	-.03	-.05	1.00

Table 11

Dependent Variable: Frequency of using TABS

Multiple Correlation: .52

Squared multiple correlation: .27

Variable	Coefficient	Standard Error	T	P (2 tail)
Constant	.61	.79	.78	n.s.
Info adequacy	.66	.22	2.94	.01
Hours flown	.41	.08	5.11	.001

Significance of Regression: $F(2,100) = 18.07$, $p < .001$.

Table 12

Dependent Variable: Usefulness of TABS

Multiple Correlation: .61

Squared multiple correlation: .38

Variable	Coefficient	Standard Error	T	P (2 tail)
Constant	.86	.45	1.91	n.s.
Speed	.61	.12	5.16	.001
Info adequacy	.47	.14	3.44	.001

Significance of Regression: $F(2,99) = 29.81$, $p < .001$.

Table 13

Dependent Variable: Overall rating of TABS

Multiple Correlation: .57

Squared multiple correlation: .33

Variable	Coefficient	Standard Error	T	P (2 tail)
Constant	.65	.52	1.23	n.s.
Speed	.54	.12	4.43	.001
Graph	.50	.16	3.08	.01

Significance of Regression: $F(2,98) = 23.73$, $p < .001$.

Appendix 1

The regression analyses tried to identify which variables best predicted the following 3 dependent variables -- 1) frequency of using TABS; 2)usefulness of TABS; and 3) overall rating of TABS.

The independent variables entered into the regression equations consisted of background variables (expertise of the pilot, sex of the pilot, age of the pilot, and hours flown by the pilot in the past 12 months) and rated characteristics of the TABS system (speed, adequacy of the information, graphics capabilities of TABS, nature of the interaction by users with TABS, reliability of TABS and the time it takes to learn how to use TABS).

Many of these variables were created by summing scores from questions that appeared to be focusing on different aspects of the same issue. For example, the speed variable combines the following questions (time to get to the "WELCOME" page; effort required to use the TABS service; time to get a TABS briefing; time to sign onto the TABS system and for the "WELCOME" page to display; time for complicated maps to be displayed; time to display other pages; and time to get all needed information (briefing time).

To provide an estimate of the inter-item correlation a Cronbach alpha coefficient was calculated for each of the derived variables (Carmines and Zeller, 1979). In the case of the speed variable the alpha coefficient was .86.

Appendix 2 contains a listing of all the derived variables, the questions used to construct them, and the alpha coefficients calculated for each aggregated variable. The alpha coefficients ranged from .59 to

.86 and averaged .77. These results are quite good given that the questionnaire has not undergone several revisions.

There are two reasons for trying to reduce the number of variables entered into the regression analyses. First, there is a rule of thumb that the number of variables should not exceed 10% of the number of observations to avoid spuriously high correlations from occurring. And second, the task of interpreting the findings is considerably more straightforward if only a small number of variables need to be considered.

Table 10 shows the Pearson correlation matrix of all the variables used in the multiple regression analyses. The coefficients were calculated in a pairwise fashion. That is, all the available data between each pair of variables was used to calculate the Pearson coefficient. This table will be particularly useful to refer back to when the results of the regression analyses are presented in the next section.

The following procedure was used in performing the regression analyses on each of the three dependent variables. First, the background variables were entered into a multiple regression analysis to determine whether any were significantly related with the dependent variable. Then, any of the background variables that were significantly related to the dependent variable and the other independent variables (rated characteristics of TABS) were entered into a stepwise linear regression analysis (e.g., Draper & Smith, 1966). The alpha-to-enter and remove was set at .15.

Stepwise regression: Dependent variable, frequency of using TABS. With the dependent variable frequency of using TABS, a multiple linear regression analysis on the background variables indicated that only the number of hours flown was significantly related to the dependent

variable. The interpretation of this result is straightforward. Pilots, who flew more hours in the past twelve months used TABS more frequently.

The hours flown variable was then entered into a stepwise regression analysis together with the other independent variables. The results of this analysis are shown in Table 11. It indicates that two variables, the adequacy of the information and the hours flown, together are significant predictors of TABS use, $F(2,100)=18.07$, $p < .001$. However, the multiple correlation of .52 indicates that that the two independent variables do not come close to fully predicting the frequency of TABS usage. The interpretation of the equation is that people who have flown more hours and rate more positively the adequacy of the information use TABS more frequently.

Stepwise regression: Dependent variable, usefulness of TABS. Results of entering all the background variables into a multiple regression analysis showed that none of these variables was significantly related to the usefulness of TABS. Results of the stepwise regression analyses, shown in Table 12, indicate that two variables, information adequacy and speed relate significantly to the rated usefulness of TABS, $F(2,99) = 29.81$, $p < .001$, and have a multiple correlation value of .61. These results indicate that pilots more favorable about the speed of TABS and its informational adequacy tend to rate TABS as a more useful system.

Stepwise regression: Dependent variable, overall rating of TABS. None of the background variables entered into the multiple regression equation were significantly related to the overall rating of TABS. Results of the stepwise regression analysis are summarized in Table 13. They indicate that two variables speed and graph are significantly related to the overall rating of TABS, $F(2,98) = 23.73$, $p < .001$, having a multiple

correlation of .57. These results indicate that higher ratings of speed and the graphics capabilities of TABS predict a higher overall rating of TABS.

Discussion of the regression analyses. Results from the regression analyses found that no background variables other than hours flown in the past 12 months were related significantly with any of the dependent variables.

The finding that different independent variables are better predictors for different dependent variables is not particularly surprising because different dependent variables focus on different aspects of the TABS system. However, a question that requires some consideration is whether any dependent variable is more important. Throughout this study, we have paid particular attention to those factors that influence the frequency of using TABS. There are two main reasons for this focus. First, before a system can be viable, it must be used. Second, a useful practical indicator of a well designed system meeting a genuine need is that it gets used. When a pilot selects TABS from among the several alternative weather information services (e.g., phone weather information services, personal briefings) and uses it, the pilot is making a decision that implies that he believes that TABS can effectively meet his particular information needs.

If this reasoning is accepted then particular attention should be paid to pilots who fly frequently and to the perceived adequacy of the information on TABS since these two variables best predict frequency of using TABS. The adequacy of information variable is an aggregate of five questions. Two of these questions focus on how up-to-date the information is, and three questions dealt with the information present in the system

(amount and type of information, accuracy of information, and geographical coverage). To determine whether all components are predictive of the frequency of using TABS, the "extra sum of squares" principle (Draper & Smith, 1968) was used and the variance accounted for when there were 2 independent variables (the number of hours flown in the past 12 months and one of the five questions comprising information adequacy) was compared to the variance accounted for when the regression analysis contained only one independent variable, the number of hours flown in the past 12 months. Results from these analyses indicated that the amount and type of information question contributed significantly ($F(1,110) = 13.49$, $p < .01$), as did accuracy of information ($F(1,107) = 7.24$, $p < .01$), and geographical coverage ($F(1,112) = 10.01$, $p < .01$), whereas both the information out-of-date variables were statistically non significant ($F(1,105) = 1.52$, $p > .10$; and $F(1,110) = 1$, $p > .10$).

These results suggest that one effective way to increase TABS usage would be to ensure that TABS contains the appropriate information for pilots. This information should have adequate geographical and altitude coverage and be perceived as accurate. This result seems quite reasonable. A pilot who flies a small plane from Ottawa to Toronto is more likely to consult TABS than a pilot who flies to the United States or who flies at high altitudes because the latter types of pilots will find less of the information they need in TABS.

Results from the other stepwise regression analyses confirm that adequacy of information is an important factor and suggest that speed and graphics are also important. The speed variable is an amalgamation of a number of questions that focus on the speed of response by TABS. Questions include the time to sign onto the system and for the "WELCOME"

page to display, the time for maps and other pages to get displayed, and the time for a briefing. Results indicate that pilots are generally dissatisfied with all these aspects of TABS. They would like to see a system that responds more quickly.

The graphics variable, which is an amalgamation of questions that enquire about the use of colored maps and symbols to display weather information, indicates that pilots generally are quite positive about this method of presenting weather information.

In summary, results from the regression analyses suggest that particular attention should be paid to the adequacy of the information present in TABS to meet the needs of the pilots, In addition, pilots would like TABS to provide information more rapidly. On a positive note, pilots generally rate the use of colored maps and symbols to display weather information quite positively.

Appendix 2

SPEED Alpha = .86

Getting to the "WELCOME" page

Effort required to use the TABS service

Time to get a TABS briefing

Time to sign onto the TABS system and for the "WELCOME" page to display

Time for complicated maps to be displayed

Time to display other pages

Time to get all needed information (briefing time)

INFO Alpha = .76

Amount and type of information

Information may be out-of-date

Accuracy of information

The information on TABS may be out-of-date

Geographical coverage of TABS

GRAPH Alpha = .75

Use of maps and symbols to depict weather information

The colour contrast in maps

Maps too cluttered

The use of red/yellow/green colour coding on the VFR/MVFR/IFR page

Not enough detail on maps

Appendix 2 continued

INTERACTION Alpha = .78

Go at your own speed

The use of menus to retrieve needed pages

The structured briefing (option 1 on "WELCOME" page)

The selected briefing (option 2 on "WELCOME" page)

Lack of "personal" communication with a briefer

TIME TO LEARN TABS Alpha = .77

Time to learn how to use the service

The amount of time it takes to learn how to use TABS

EXPERTISE Alpha = .59

What time of licence do you have?

How did you learn about aviation meteorology?

How would you rate your meteorological expertise relative to the average pilot?[1]

RELIABILITY Alpha = .86

Reliability of the equipment

Reliability of the system

---

[1]Scores transformed

Appendix 3

Questions Used from Questionnaire to Construct Tables in Report

Table in Report	Question number(s) in user questionnaire
1	I.7; I.8
2	I.8
3	I.4
4	I.5
5	I.6
6	III.1
7	IV.1
12	V.1; V.2; V.3
13	V.7; V.8

Appendix 4

User and Non-user Questionnaires

USER QUESTIONNAIRE

TELIDON AVIATION BRIEFING SYSTEM

Transport Canada in co-operation with the Government of Ontario and the Atmospheric Environment Service is conducting a survey to assess the usefulness of the Telidon Aviation Briefing System (TABS).

We would appreciate your help in evaluating and improving TABS by checking off your answers to a series of questions. For each question, please check the answer that most closely describes your feelings or your understanding of the situation. We want your personal feelings and reactions - not what others might think or what might seem to be the best answer. We would appreciate it if you would answer all of the questions.

Thank you for your co-operation. If you have questions, please ask the person who handed you the questionnaire for clarification. That person will also collect the questionnaire when it is completed.

FOR OFFICE USE ONLY

Airport _____
Date _____
Collected by _____

I. USE OF TABS

1. How often have you used TABS since it was introduced?

____ once
____ 2-5 times
____ 6-10 times
____ 11-20 times
____ 21-40 times
____ 41-80 times
____ more than 80 times

2. Please estimate when you last used TABS?

_____ month 19____ year

3. What overall rating would you give to TABS?

____ very poor ____ inadequate ____ adequate
____ good ____ excellent

4. Listed below are a number of possible reasons for obtaining a weather briefing. Using the scale provided indicate how often you use TABS or <u>any other</u> weather service to get briefed. (PLEASE PLACE A NUMBER NEXT TO EACH ITEM).

1	2	3	4	5	6
never	rarely	sometimes	usually	almost always	always

____ to fly from one location to another (itinerant)
____ to fly in the general vicinity of the home airport
____ as a preliminary means of deciding whether to fly (go/no go)
____ for flight training
____ to obtain a general idea about weather conditions before deciding where to fly
____ to update/expand on a previous briefing
____ curiosity about the weather
____ other (specify)_____
_____

5. This question also lists reasons for obtaining a weather briefing. For each reason use the scale provided to indicate which weather service you prefer to use. (PLEASE PLACE A NUMBER NEXT TO EACH ITEM).

1	2	3	4	5
much prefer TABS	prefer TABS	no preference	prefer non-TABS service	much prefer non-TABS service

____ to fly from one location to another (itinerant)
____ to fly in the general vicinity of the home airport
____ as a preliminary means of deciding whether to fly (go/no go)
____ for flight training
____ to obtain a general idea about weather conditions before deciding where to fly
____ to update/expand on a previous briefing
____ preliminary briefing to prepare for later update/expansion
____ curiosity about the weather
____ other (specify)_____

6. Below is a list of words and phrases that describe characteristics of weather information services. For each characteristic, indicate how it affects <u>your</u> use of TABS and your use of the telephone briefing services (AES and FSS). Use the scale below for your response. (PLEASE PLACE A NUMBER BESIDE EACH ITEM).

1	2	3	4	5
very much discourages use	somewhat discourages use	no effect at all	somewhat encourages use	very much encourages use

TABS	TELEPHONE BRIEFING SERVICES	CHARACTERISTICS OF SERVICES
		Usefulness
		Reliability of equipment
		Getting to the "WELCOME" page/ Getting a busy signal
		Effort required to use the service
		Time to get a briefing
		Amount and type of information
		Information may be out-of-date
		Accuracy of information
		Time to learn how to use the service

7. Before TABS was introduced, indicate by using the scale below, how frequently you obtained each of the following kinds of briefings.(PLEASE PLACE A NUMBER BESIDE EACH ITEM).

1	2	3	4	5	6
never	rarely	sometimes	usually	almost always	always

____ phone briefing (AES, FSS)
____ personal contact with an (AES, FSS) briefer
____ TWB (Transcribed weather broadcast)
____ other (specify)_____
____ no weather briefing at all

8. Thinking about the flights you have taken since TABS became available, indicate by using the scale below, how frequently you obtained each of the following kinds of briefings or combinations of briefings. (PLEASE PLACE A NUMBER BESIDE EACH ITEM).

1	2	3	4	5	6
never	rarely	sometimes	usually	almost always	always

____ phone briefing (AES, FSS)
____ personal contact with an (AES, FSS) briefer
____ TWB (Transcribed weather broadcast)
____ TABS
____ TABS followed by phone briefing (AES, FSS)
____ Phone briefing (AES, FSS) followed by TABS
____ TABS followed by personal contact with an (AES, FSS) briefer
____ personal contact with an (AES, FSS) briefer followed by TABS
____ TABS followed by TWB
____ TWB followed by TABS
____ other
____ no weather briefing at all

II. GEOGRAPHICAL COVERAGE

1. What is the geographical area currently covered by the surface analysis/prognosis (SFCA/SFCP) pages in TABS? (CHECK ONE ANSWER ONLY).

____ Southern Ontario
____ Ontario
____ Canada and Northern U.S.A.
____ North America
____ Global
____ do not know

2. About what geographical area do you usually require information when obtaining a weather briefing? (CHECK ONE ANSWER ONLY).

____ Southern Ontario
____ Ontario
____ Canada and Northern U.S.A.
____ North America
____ Global

III. TABS FEATURES

1. Below is a list of TABS features. For each one, indicate how it it affects your use of TABS. Use the scale below for your responses.

1	2	3	4	5
very much discourages use	somewhat discourages use	no effect at all	somewhat encourages use	very much encourages use

Speed

____ time to sign onto the TABS system and for the "WELCOME" page to display
____ time for complicated maps to be displayed
____ time to display other pages
____ time to get all the needed information (briefing time)

Information available

____ the information on TABS may be out-of-date
____ use of maps and symbols to depict weather information
____ the colour contrast in maps
____ the use of abbreviations in text
____ geographical coverage of information
____ availability of information at different altitudes
____ maps too cluttered
____ the use of red/yellow/green colour coding on the VFR/MVFR/IFR page
____ not enough detail on maps

Interaction

____ go at your own speed
____ the use of menus to retrieve needed pages
____ the structured briefing (option 1 on "WELCOME" page)
____ the selected briefing (option 2 on "WELCOME" page)

____ lack of "personal" communication with a briefer

Other

____ the amount of time it takes to learn how to use TABS
____ the "HELP" pages on TABS
____ the printed instruction manual (user brochure)
____ the reliability of the equipment
____ waiting in line for other TABS users to complete their briefings
____ the hours of operation of TABS (between 0600 and 2100)
____ other _____

IV. IMPROVEMENTS TO TABS

1. Below is a list of possible changes that could be made to TABS. For each one indicate to what extent it would affect your use of TABS.

1	2	3	4	5
very much discourage use	somewhat discourage use	no effect at all	somewhat encourage use	very much encourage use

____ printed copy of the relevant information
____ simpler keyboard
____ possible to use TABS from your home
____ possible to use TABS from your business
____ capability of filing a flight plan
____ automatic warning if filed flight plan may involve risk
____ display of clearer pictures
____ high altitude weather information (above 18,000)
____ capability of selecting up to 3 upper-level winds for North America
____ briefings tailored to your route (corridor briefing)
____ displays that show the movement of the weather systems
____ displays from additional radar sites
____ practical, refresher computerized courses on aviation weather
____ availability of TABS terminals across Canada
____ weather information for all Canada
____ weather information for all of North America
____ weather information for North and South America
____ global weather information
____ audio delivery of some information as a supplement to visual information

other _____
_____
_____

V. BACKGROUND

1. Sex: ____ male ____ female

2. Age: ____ under 25
____ 25-35
____ 36-45
____ 46-55
____ 56-65
____ over 65

3. What type of licence do you have?

____ Private Pilot's Licence (PPL) (VFR only)
____ PPL with night rating
____ PPL with IFR rating
____ Commercial Pilot's Licence (without instrument rating)
____ Commercial Pilot's Licence (class 1)
____ Commercial Pilot's Licence (class 2)
____ Senior Commercial Pilot's Licence (class 1)
____ Senior Commercial Pilot's Licence (class 2)
____ Air Transport Rating
____ other (Specify): _____

4. How many hours have you flown in the past 12 months?

____ 0-20 hours
____ 21-40 hours
____ 41-100 hours
____ 101-200 hours
____ 201-400 hours
____ 401-1000 hours
____ 1001 or more hours

5. From which airport do you usually fly? _____

6. What type and model of aircraft do you usually fly?

_____

7. What is the takeoff weight of the aircraft you usually fly?

	Kilograms	Pounds
____	2000 and under	4400 and under
____	2001-4000	4401-8800
____	4001-5670	8801-12474
____	5671-18000	12475-39600
____	18001-35000	39601-77000
____	35001-70000	77001-154000
____	70001-136000	154001-299200
____	136001 and over	299201 and over
____	do not know	

8. What is the source of propulsion of the aircraft you fly most often? (Check 1 only).

____ Ultralight
____ Piston
____ Turboprop
____ Jet
____ Helicopter
____ Glider

9. From what source did you obtain most of your knowledge about TABS?

____ personal use of TABS
____ conversations with airport/FOB staff or flying instructors
____ conversations with other TABS users
____ observing others using TABS
____ media
____ other

10. How did you learn about aviation meteorology: (check more than 1 answer if it describes your training).

____ in ground school for private pilot's licence?
____ when getting an additional rating
____ military
____ in a community college training course
____ self study
____ other (specify):_____

11. How long ago did you take your most recent formal weather training or update?

____ within the past week
____ 1-4 weeks ago
____ 2-6 months ago
____ 7-12 months ago
____ 1-2 years ago
____ 2-5 years ago
____ 6-10 years ago
____ more than 10 years ago

12. Do you think you have enough weather training to use and understand the parts of TABS you need?

____ Yes ____ No

13. How do you rate your meteorological expertise relative to the average pilot?

____ much more knowledgable
____ somewhat more knowledgable
____ about the same
____ somewhat less knowledgable
____ much less knowledgable

NON-USER QUESTIONNAIRE

TELIDON AVIATION BRIEFING SYSTEM

Transport Canada in co-operation with the Government of Ontario and the Atmospheric Environment Service is conducting a survey to assess the usefulness of the Telidon Aviation Briefing System (TABS).

We are interested in getting more information from people who have never used TABS. We would appreciate your help by checking off your answers to a series of questions. For each question, please check the answer that most closely describes your feelings or your understanding of the situation. We want your personal feelings and reactions - not what others might think or what might seem to be the best answer. We would appreciate it if you would answer all of the questions.

Thank you for your co-operation. If you have questions, please ask the person who handed you the questionnaire for clarification. That person will also collect the questionnaire when it is completed.

FOR OFFICE USE ONLY

Airport _____
Date _____
Collected by _____

I. USE OF WEATHER INFORMATION SERVICES

1. Listed below are a number of possible reasons for obtaining a weather briefing. Using the scale provided indicate how often you use <u>any</u> weather service to get briefed. (PLEASE PLACE A NUMBER NEXT TO EACH ITEM).

1	2	3	4	5	6
never	rarely	sometimes	usually	almost always	always

____ to fly from one location to another (itinerant)
____ to fly in the general vicinity of the home airport
____ as a preliminary means of deciding whether to fly (go/no go)
____ for flight training
____ to obtain a general idea about weather conditions before deciding where to fly
____ to update/expand on a previous briefing
____ curiosity about the weather
____ other (specify)_____
_____

2. Below is a list of words and phrases that describe characteristics of weather information systems. For each characteristic, indicate how it affects <u>your</u> use of the telephone briefing services (AES and FSS). Use the scale below for your response. (PLEASE PLACE A NUMBER BESIDE EACH ITEM).

1	2	3	4	5
very much discourages use	somewhat discourages use	no effect at all	somewhat encourages use	very much encourages use

TELEPHONE BRIEFING SERVICES	CHARACTERISTICS OF SYSTEMS
	Usefulness
	Reliability of equipment
	Getting a busy signal
	Effort required to use the service
	Time to get a briefing
	Amount and type of information
	Information may be out-of-date
	Accuracy of information
	Time to learn how to use the service

3. Have you ever tried to use TABS?

____ yes ____ no

4. What overall rating would you give to TABS?

____ very poor ____ inadequate ____ adequate
____ good ____ excellent

5. Before TABS was introduced, that is, before August 1984, indicate by using the scale below, how frequently you obtained each of the following kinds of briefings.(PLEASE PLACE A NUMBER BESIDE EACH ITEM).

1	2	3	4	5	6
never	rarely	sometimes	usually	almost always	always

____ phone briefing (AES, FSS)
____ personal contact with an (AES, FSS) briefer
____ TWB (Transcribed weather broadcast)
____ other (specify)_____
____ no weather briefing at all

6. Thinking about the flights you have taken since TABS became available, indicate by using the scale below, how frequently you obtained each of the following kinds of briefings. (PLEASE PLACE A NUMBER BESIDE EACH ITEM).

1	2	3	4	5	6
never	rarely	sometimes	usually	almost always	always

____ phone briefing (AES, FSS)
____ personal contact with an (AES, FSS) briefer
____ TWB (Transcribed weather broadcast)
____ other
____ no weather briefing at all

7. Listed below are a number of reasons why you may not be using TABS. For each reason, use the scale provided to indicate to what extent it discourages you from trying to use TABS.

1	2	3	9
very much discourages use	somewhat discourages use	no effect at all	no opinion

____ do not know anything about TABS (If this is the case go to section II).
____ does not contain the information I need
____ too difficult to use
____ takes too long to learn how to use
____ takes too long to get a briefing
____ takes too long to "get into the system"
____ satified with existing weather services
____ not available at the airport from which I usually fly
____ not available at the times when I usually fly
____ equipment unreliable
____ information out-of-date
____ information inaccurate
____ do not need weather briefings
____ too impersonal
____ other (specify)_____

_____

II. GEOGRAPHICAL COVERAGE

1. What is the geographical area currently covered by the surface analysis/prognosis (SFCA/SFCP) pages in TABS? (CHECK ONE ANSWER ONLY).

____ Southern Ontario
____ Ontario
____ Canada and Northern U.S.A.
____ North America
____ Global
____ do not know

2. About what geographical area do you usually require information when obtaining a weather briefing? (CHECK ONE ANSWER ONLY).

____ Southern Ontario
____ Ontario
____ Canada and Northern U.S.A.
____ North America
____ Global

III. BACKGROUND

1. Sex: ____ male ____ female

2. Age: ____ under 25
____ 25-35
____ 36-45
____ 46-55
____ 56-65
____ over 65

3. What type of licence do you have?

____ Private Pilot's Licence (PPL) (VFR only)
____ PPL with night rating
____ PPL with IFR rating
____ Commercial Pilot's Licence (without instrument rating)
____ Commercial Pilot's Licence (class 1)
____ Commercial Pilot's Licence (class 2)
____ Senior Commercial Pilot's Licence (class 1)
____ Senior Commercial Pilot's Licence (class 2)
____ Air Transport Rating
____ other (Specify): _____

4. How many hours have you flown in the past 12 months?

____ 0-20 hours
____ 21-40 hours
____ 41-100 hours
____ 101-200 hours
____ 201-400 hours
____ 401-1000 hours
____ 1001 or more hours

5. From which airport do you usually fly? _____

6. What type and model of aircraft do you usually fly?

_____

7. What is the takeoff weight of the aircraft you usually fly?

	Kilograms	Pounds
____	2000 and under	4400 and under
____	2001-4000	4401-8800
____	4001-5670	8801-12474
____	5671-18000	12475-39600
____	18001-35000	39601-77000
____	35001-70000	77001-154000
____	70001-136000	154001-299200
____	136001 and over	299201 and over
____	do not know	

8. What is the source of propulsion of the aircraft you fly most often? (Check 1 only).

____ Ultralight
____ Piston
____ Turboprop
____ Jet
____ Helicopter
____ Glider

9. From what source did you obtain most of your knowledge about TABS?

____ conversations with airport/FOB staff or flying instructors
____ conversations with TABS users
____ observing others using TABS
____ media
____ not at all familiar with TABS
____ other

10. How did you learn about aviation meteorology: (check more than 1 answer if it describes your training).

____ in ground school for private pilot's licence?
____ when getting an additional rating
____ military
____ in a community college training course
____ self study
____ other (specify):_____

11. How long ago did you take your most recent formal weather training or update?

____ within the past week
____ 1-4 weeks ago
____ 2-6 months ago
____ 7-12 months ago
____ 1-2 years ago
____ 2-5 years ago
____ 6-10 years ago
____ more than 10 years ago

12. Do you think you have enough weather training to use and understand the parts of TABS you need?

____ Yes ____ No

13. How do you rate your meteorological expertise relative to the average pilot?

____ much more knowledgable
____ somewhat more knowledgable
____ about the same
____ somewhat less knowledgable
____ much less knowledgable